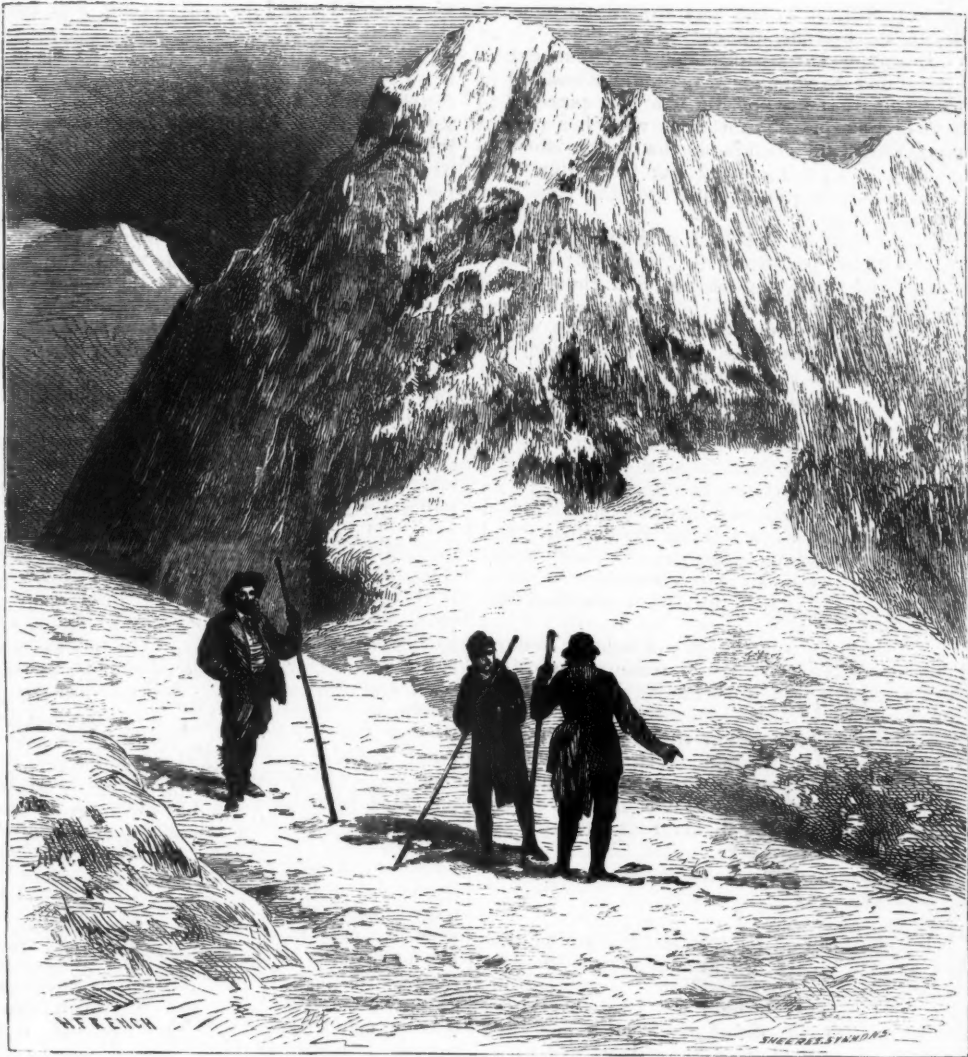


# THE LEISURE HOUR.

BEHOLD IN THESE WHAT LEISURE HOURS DEMAND,  
AMUSEMENT AND TRUE KNOWLEDGE HAND IN HAND.—*Comber.*



NEAR THE PIERRE L'ECHELLE.

## "WAIT A YEAR."

CHAPTER V.

SOON after his second visit to Hillesden, Mr. Sinclair, dissatisfied with the communication received, went to Geneva to plead his cause in person. At the interview Helen remained inexorable. She determined to punish him for deceiving her, as she termed it, and this, not by breaking off the match, but by leaving him doubtful of her intentions.

For a whole twelvemonth he was to forego her society, and at the end of that time she would give him a definite answer. Though he protested against her cruelty, he was secretly rejoiced that it was no worse. To lose Helen was to lose more than his love, it was to strip life bare of the promises that made it bright and sunny as it had never been before he knew her. Without her he could not imagine it possible for him now to be happy. Already was it something that the sweet hopes that had

No. 1413.—JANUARY 25, 1879.

PRICE ONE PENNY.

given such a novel charm, even to ordinary things, might yet be his, though painfully overshadowed by coldness and delay.

"You could hardly do this, Helen, if you loved me," he remonstrated, when she imposed her imperious will.

"If you like better, we will end the engagement now," was her unmoved rejoinder.

That being the possibility he had been dreading all along, he was only too glad to find he had yet power to prevent it by the sacrifice of his personal feelings. At first he did not so very much blame her. Indeed, as she recapitulated the circumstances and stated her grounds for displeasure, depicting in glowing colours the happy life she had expected to pass with him, and contrasted it with her present disappointment, he felt that she had some cause to complain. And yet it grieved him to perceive that his motives had no weight with her, that they were not even understood.

The interview he obtained with difficulty was short, and on her part decisive. Finding every effort to shake her resolution useless, and that cordial intercourse was at present impossible, he was constrained to submit, but pledged himself to return joyfully at the slightest word of encouragement.

"At the end of a year, that is, on the 30th of next June," answered Helen, with perfect coolness.

"Be more reasonable and kind," pleaded Mrs. Lestocq, who, more shrewd and less proud than her daughter, sided with Mr. Sinclair. Though fully alive to Helen's attractions, her knowledge of men perhaps suggested the possibility of straining the bow too far, which was the last thing she desired. But Helen was too conscious of her power to listen to any reasoning but her own, and answered haughtily, "Mr. Sinclair has blighted my life, it will take time for me to forgive him."

"If you could but see things differently, Helen," he remonstrated, gently, really feeling himself so much of a culprit, that if she would have departed but a little from her hard, resentful mood, he was ready to make any concession short of principle to appease her.

"And if you had acted differently," retaliated Helen, "if you had consulted me at least before taking a step so adverse to my happiness—" she stopped, reading her mistake in Mr. Sinclair's eyes.

"Would you not have attempted to dissuade me?" he asked.

"Perhaps; what then?"

He did not answer; he was internally glad that he had not offended in the greater degree of turning a deaf ear to her entreaties. He loved her, and his heart once given could not bear to go back to the joyless, matter-of-fact days when men and books were his only sources of interest.

"I will wait for your better mood, Helen," he said, after a pause. "Perhaps you will recall your decision when you think upon its unkindness. I shall write to you—"

"No, not a line, not a word till the 30th of June."

"And if I infringe these hard conditions—"

"We will put an end to the engagement now if you prefer it," she answered, with every appearance of indifference.

"I will wait," replied Mr. Sinclair. He had so often contemplated the prospect of losing her, and knew so well what that would cost him, that he had no occasion to take further counsel with himself.

He was too poor in ties of affection to afford to lose her. And so they parted, coldly, yet not estranged, for he looked forward to the termination of his probation, not with the vivid anticipations he had at first enjoyed, but as to a period when he should settle down without any further anxieties. Naturally tenacious of purpose, Warren Sinclair was a man who rarely let go an idea once conceived, and in that, as in many other respects, was the opposite of his brother, who frequently boasted of having no fancies for which he would do battle twenty-four hours after they were formed.

When Mr. Sinclair left Helen, he made up his mind to resume the habit of travelling. His erratic tastes had hitherto led him chiefly to the East, but there was much to interest him nearer home. A great part of Switzerland was new to him. Among its mountains and valleys he might, he thought, pass his time more agreeably than in England, and also be within reach when Helen should change her ideas. That she would persevere to the end of the time specified he hardly believed. Nothing could have been better for him than the wandering life to which he now betook himself, perhaps no other could have been less advantageous to Helen. Nature is all truth, as well in its sublimities and grandeurs as in its peace and simplicity. Who could wander among the marvels of a great mountain country without being the better for what he saw? Those mysterious operations, lost in a silence that none can break, in a secrecy that no created being can reveal, affect the mind with such a sense of awe and wonder that ordinary subjects lose their importance. Many over which we are accustomed to fret dwindle into insignificance. They appear too short-lived to be worth our sorrow, not of more account in the chronicles of time than an insect's life in comparison with our own. God only we feel to be great, and then we learn that only as circumstances link us closer or distance us from Him, the source of all good, can they assume any real significance.

Warren's institution to the living of Hillesden, though the outcome of the workings of his own mind, had also been what Helen never surmised, the touchstone of her own character, over which he daily pondered in those solitary rambles in which he indulged after leaving Geneva. Why should it be such a fault in her eyes that he could no longer be content with a useless existence? why, above all, did she so shrink from the position he had to offer her? That question he did not care to answer. Nothing could diminish in his eyes the beauty of his betrothed, not even the stiff *hauteur* with which she had received his entreaty for less rigorous treatment; but as days went on he began to reflect upon himself for having yielded so weakly to her attractions. What was the charm, what was the fascination, that had broken up his tranquil life and filled him with disquietude and anxious longings that certainly had no satisfaction in them? Where was the calm good sense which hitherto had been the guide of his actions? Remote from the false glitter that had lately dazzled him, he began to see things rather differently, and to experience a tardy doubt of his own wisdom. To say that he was *désillusionné* would be too much, but he was ruffled and ill at ease, at peace neither with himself nor with others. If Helen persisted in her expressed resolve to hold no communication with him for a year, all his plans must be changed.

Instead of beginning his married life while he had

leisure to give himself up to domestic enjoyments, he had before him six months without any definite object in view. He could not shorten Mr. Moreton's tenure of the living, for that would be unkind, as well as unusual, and consequently he could not enter upon his work before Christmas. Up to that period the time would drag heavily if he had no particular occupation; afterwards there would be the new sphere of duty, and certain alterations and improvements to make in the Rectory. His thoughts turned again towards the East, and he resolved to go there when tired of Switzerland. He felt that he could now revisit the scenes of sacred story with even greater interest than when he first saw them.

The greatest lover of solitude, says a cynic, requires a companion with whom to laud its beauty. Mr. Sinclair heard with pleasure that his brother Captain Orde intended to join him. However much he might profit by his solitary rambles, he knew the value of fellowship. The mind cannot long remain at its highest pitch any more than the eye can be always satisfied with the majestic. The one requires to descend into ordinary life as the other asks for softer beauty, and often turns with livelier, though less exalted pleasure, from the giant mountains, capped by their eternal snow, to the humbler crags, flushed with the Alpine rose and clad with verdure.

By the time Captain Orde arrived Mr. Sinclair's feelings towards Miss Lestocq had undergone some change. If his regret were essentially undiminished it was so mixed with irritation that though he knew his brother had seen both mother and daughter more recently than himself, he abstained from making any inquiry about them. Cecil was obliged to volunteer his information, which was that Mrs. Lestocq and Helen had left Geneva, and were gone to the Château Prangin, a pension near Nyon, with some friends whom they had known at Cannes.

Captain Orde's intention was to pass a short time with his brother while waiting for some companions with whom he purposed attempting some of the difficult passes, where a little danger gives increased zest, but which were altogether beyond the less vigorous powers of Warren Sinclair. Though when together the latter felt secretly fretted over his own incapability to endure the same fatigue as Cecil, he was, nevertheless, the better for contact with his brother's cheerful character. Differing too much in many important respects to be cordially affectionate, they yet acknowledged and valued what was good in each other. Warren had often paid Cecil's debts, and was more willing to give than Cecil to take; the latter being proud, the elder brother in him revolted at being too dependent upon a younger, besides that, he knew the bulk of his brother's property to be entailed, and had some honest scruples in hampering him by accepting too often his ready money.

"I am neither good nor bad, but I am troubled with a bit of a conscience," he used to say, and was content to enjoy what was, at best, a dangerous respectability. It was not without a sigh of regret that Warren suffered his wishes to be put aside as impracticable and impossible when he desired to make one of Cecil's party.

"You could not do it, Warren; you would be a bore to yourself as well as to us," said Cecil, more bluntly than politely; "it would be manslaughter in me to permit it. What you can do with me alone I am willing to attempt, but when my friends arrive we leave you behind."

As Cecil was not to be persuaded to alter his route nor suffer his brother to accompany him, Warren felt himself obliged to remain alone, and was much annoyed, estimating perhaps too highly the pleasures of adventure, as we are apt to do advantages that we do not possess. And this weakness was fostered every day by the visitors coming and going, bent for the most part on excursions where strength and agility were absolutely necessary. Chamounix, where they now were, owes its world-wide reputation less to the beauty of its situation than to the feats of muscle and endurance it can chronicle; also—and we must add an emphatic alas!—also to the tragic tales it has from time to time to record. Yet ever and ever will the fascination of its wild magnificence continue, luring many to imprudence and some to death.

Cecil Orde was as good as his word. He accompanied his brother to all the regular excursions of the general tourist to green valleys, sunny glades, and through many a dark forest of tall pines leading to the hilltops above, whose irregular outlines cut sharply against the soft grey sky. They crossed the Mer-de-Glace, which was but a child's feat for Cecil; they plucked the blue gentian from the rougher ground of the Jardin, and that was something more. It tried Warren Sinclair's climbing powers to the utmost of prudence.

"Where shall we go?" asked Cecil the last morning of his intended stay at Chamounix. They had started with a guide, and were not agreed in the excursion to be made. One proposed turning in one direction, one in another. "Let us go once more to the Brevet," said Cecil; "the weather is good for walking—not too sunny. We shall have a fine view; the route to Mont Blanc will be clearly distinguished."

Warren consenting, they were about to start, when the guide, by a chance observation, changed their plan, and the colour of a life besides. He spoke of his brother being engaged that afternoon to accompany a party in the ascent of Mont Blanc.

"We might walk in that direction; we should see them when they pass; they must sleep at the Grands Mulets. We can easily go as far as the Pierre Pointue," added Cecil, appealing to the guide.

He consented, and they were soon wending their way over greensward and stony paths, where the pine-trees bared their shaggy roots beside murmuring brooks, roaring torrents, or swampy ground, and all the diversified accidents of the mountain-paths, until they reached the glacier. Whence comes the charm these granite walls of ice exercise upon the beholder—the fascination of the great white masses of snow, swept by a breeze that stirred the pulses to unvented vigour, and gave to mind and body unusual elasticity! Warren felt new youth stealing through his veins, his blood warmed, his energies kindled. Walk he must, and with a physical ease that surprised him. The gaining of one point only made him more desirous to reach another. From Pierre Pointue they went on to Pierre l'Echelle, the second halting-place, which they reached while the afternoon sun was yet high in the heavens. Cecil did once remonstrate, warning Warren against fatigue to which he was not inured, and laughingly reminded him of the risk of visiting dangerous places with his heir for a companion.

But Warren was obstinate, even when he walked with difficulty. He could afford to laugh at a joke so unlikely to be realised, but he could not bring him-



self to renounce the fruits of his exertions. They had come too far on the road to turn back at a point so critical, for the interest was increasing at every step; a little farther and it would have the culminating attraction of danger—just a little to the careless and uninitiated.

"It must be a far more tangible danger than the one you suggest that would turn me back from such scenes as are now within my reach," answered Warren. But he soon found that he had miscalculated his strength. On arriving at Pierre l'Echelle he was so exhausted that it was necessary for him to propose a return.

"Right at last," replied Cecil, glad to see his brother reduced to prudence, though only by his physical weakness, but it did not enter his head to accommodate his yet untired powers to the feebler ones of Warren.

They had now reached the most remarkable part of the route leading to the summit. Nothing they had yet passed afforded a hundredth part of the excitement now glowing through his frame as these majestic forms of Nature rose before him. Dark rifts, spanned by bridges of snow, and jagged pinnacles, broke the blue-white surface, while deep abysses, unfathomable to sight or sound, at once attracted and repelled.

Whilst Warren reposed within the chalet Cecil arranged with his guide to go a little farther, finding the fascination too great to resist. "Only a little way I am going. We shall soon be back," he said to his brother, who joined him just as the roping had been effected.

"If it is only a little way, I can go too," said Warren, and notwithstanding every remonstrance from the guide as well as his brother, he persisted in his desire to make acquaintance with the wonders of the ice world, whose mysterious influence he felt for the first time. He was too near them to allow himself to be disappointed for want of spirit and energy to take advantage of a chance never likely to occur again. After some useless delay, finding that all arguments were vain against a resolution based on the "now or never," which was bracing Warren to the imprudent exertion, Cecil was obliged to yield, and this he did with additional reluctance, knowing that his brother's slower pace would materially cripple his own. The old proverb ruled again, and the wilful man had his own way. Warren declared himself sufficiently rested to proceed, and heard, with exemplary patience and dogged tenacity, the objections of his brother and the guide, who strenuously endeavoured to dissuade him. The roping was at length carefully adjusted, and they started; Michel, the guide, first, Captain Orde second, Warren next, and a young mountaineer, whom they had engaged at Pierre Pointue, last. For a short time they walked leisurely, but well. Warren, refreshed and rested at the chalet, did better than they expected, and they got over the ground some hundred yards without any serious difficulty, braced by the clear air and animated by the untold delight of looking round upon one high peak after another. Those trackless fields of snow, so dazzling in their whiteness, almost bewildered the senses. Warren's sensitive spirit was enchanted, and in the huge irregular masses everywhere he could recognise giants guarding the entrance to their secret caves. But soon there came a change; he breathed with difficulty, and the difficulty increased at every step. At the portals of these

grand mysteries he was obliged to give in, and consented to return, Cecil promising to join him in a short time. They were scarcely out of sight of the chalet and the newly-trodden snow marking the path by which they came; it seemed impossible to make any mistake. Reluctantly Warren saw his brother depart. They exchanged a few words of mutual caution, and then, roped to his companion between three and four yards apart, Warren began to descend, turning continually to watch Cecil as long as he was in sight. Whilst following with the eye the movements of the almost invisible figures, resembling dark spots moving on the snow, it may be that they unconsciously stepped aside and left the proper path. It could only have been a slight deviation, however, for they saw the traces of their former footsteps, and immediately endeavoured to regain them. The guide went first, and Warren followed over the smooth, glittering surface, which crunched under their feet as they went along, the sharp breeze tending rather to exhilarate than to chill. They had not gone far when a sound of something strange, a wild and fearful cry of human anguish, that once heard could never be forgotten, rung through the air, and Warren had not time to realise that his companion had disappeared when he found himself cast from the solid earth into darkness and despair.

#### ELECTRIC LIGHTING.

NOTWITHSTANDING the suddenness of its recent development, the electric light is an old and well-known source of illumination. Every electrician during the last fifty years has observed its growing importance, and could have prophesied that it would ultimately become a public illuminator and a rival to gas. There were defects, however, both in the machines used for generating the electricity required, and in the burners, or *wicks*, which under the influence of the electricity yielded the light, and it is only within the last two or three years that these have been practically overcome. The machines of Gramme and of Siemens in England, and of Brush and Wallace-Farmer in America, have now put into our hands an almost perfect means of transforming motive-power into electric currents, and the electric wicks of Jablochkoff, Lontin, Rapieff, Werdermann, Edison, and others, have given us a variety of lamps which fairly launch the electric arc as a successful artificial light of great brilliance and penetrating power.

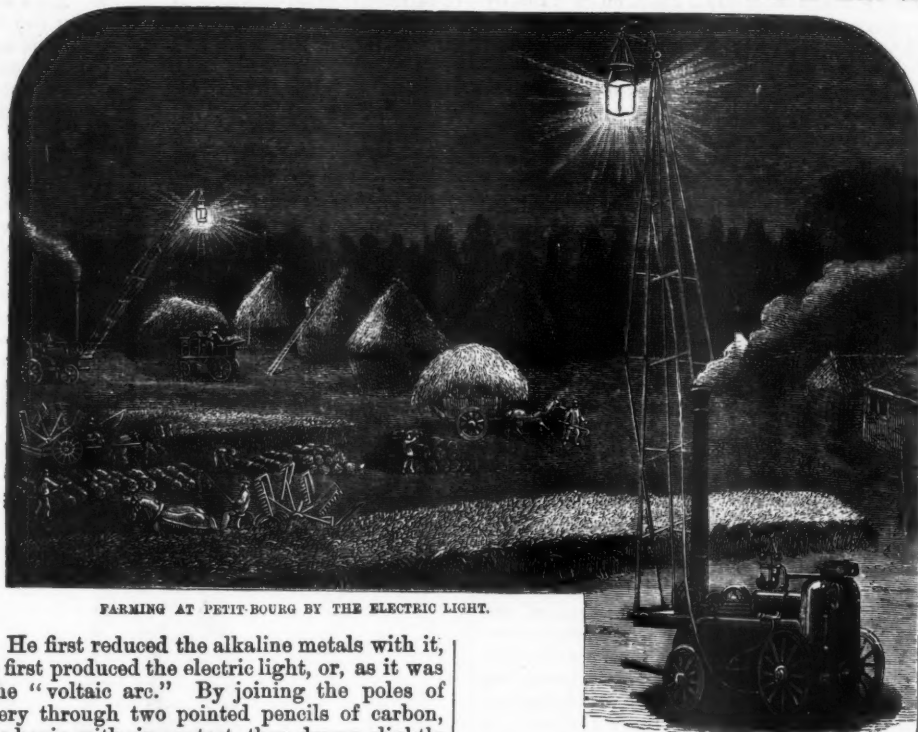
Certainly it has points of superiority over gas. It is purer in quality, gives off little heat and no pernicious fumes, and requires no matches to light it; but it has yet one failing to be overcome before it can quite drive gas-lighting from the field. It must admit of being economically subdivided into a greater number of small lights. The light itself is beyond comparison with gaslight, but it must admit of being brought into the rooms and lobbies of dwelling-houses before it can supersede gas. The most recent improvements have rendered it admirably adapted for the lighting of streets and large halls or warehouses, but there remains the problem of moderating, while distributing, its illuminating power. It is a problem which all electricians working at the subject—and there are many—are trying to solve. Its solution will certainly seal the fate of the gas companies; but it is a difficult one. Everybody knows how Mr.



Edison, the famous inventor of the phonograph, on October 4th last year, sent a cable message to Europe announcing that he had solved this problem, and the consequence was a panic in gas shares. The effect was also greatly to stimulate inventors, and the progress of the electric light has been extremely rapid since then, both in Europe and America, but especially in England.

The ordinary electric light was discovered by Sir Humphrey Davy in the early part of this century. Very soon after the discovery of the voltaic cell by the Italian physicist, Volta, the Cornish philosopher had a large battery constructed of two thousand cells, which became in his hands a powerful engine of re-

solar light was at once apparent. The extraordinary penetrating power, the deep and distinct shadows which it cast, the iridescent beauty of its source, and the fact that it showed colours almost as pure as at noonday, eminently marked it out for illuminating purposes. But many serious objections to its use were soon found. The necessary batteries were very expensive, and, worse than all, they were of inconstant strength. Besides this, the positive carbon was found to wear down so rapidly by transference of the carbon particles that the distance between the carbon points soon became too great for the current to bridge over, and consequently the arc was liable to flicker and go out. The first of these objections



FARMING AT PETIT-BOURG BY THE ELECTRIC LIGHT.

search. He first reduced the alkaline metals with it, and also first produced the electric light, or, as it was called, the "voltaic arc." By joining the poles of the battery through two pointed pencils of carbon, placed, to begin with, in contact, then drawn slightly apart, the current passed from one carbon to the other, leaping across the intervening space and filling it with an intensely brilliant light of silvery whiteness. It was soon found that there was a transference of carbon particles from the pencil in connection with the "positive" pole of the battery to that in connection with the negative pole, and that the intense white light was due to the incandescence of these carbon particles by the violent energy of the current. With his two thousand cells Davy obtained a luminous arc between the points four inches long, and he soon found that the light was not due to the ordinary burning of the carbon in the air, although this combustion does go on and helps it a little, for the light was just as brilliant in a vacuum, and took place even in water. It proved likewise to be the source of the intensest heat produced on earth. The most refractory substances melted within it or vanished in vapour. Lime and quartz were fused; iron, gold, and silver were volatilised, and platinum burned with brilliant scintillations, when held in the voltaic arc.

The striking resemblance of the electric to the

was completely obviated by the great discovery of Faraday, termed magneto-electric induction. The pupil and successor of Davy in the same laboratory thus helped on the development of the electric light. Faraday gave us the means of producing a powerful current without the help of a voltaic battery at all. In November, 1831, he took a stout ring of soft iron, about six inches across, and round one half of it he coiled a length of cotton-covered copper wire, while round the other half he coiled another length of similar wire. On sending a current from a battery through one of these coils, he obtained an instantaneous current in the other, more powerful, but in an opposite direction to the battery current; and on stopping the battery current he obtained in the other coil a powerful return current in the same direction as the battery current. Thus, by sending a weak current through one coil, he generated, or *induced*, as it is called, a momentary but very powerful current in the other. A few days after, Faraday extended his discovery, and generated induced currents in coils of wire by the mere motion of a magnet in their neighbourhood. Wrapping the ends of the copper wire of

one of these coils around two pointed pieces of carbon, and suddenly bringing a magnet near to it, Faraday could distinguish a spark passing between the carbon points at the instant of the magnet's approach. This was the germ of the later electric lights.

Elaborate machines have since been constructed for generating great and constant supplies of electricity by this magneto-electric action. At the South Kensington Loan Exhibition of Scientific Apparatus last year there was visible in one room, not far from each other, the iron ring with the rough coils and carbon points from which Faraday elicited the first tiny spark, and the dazzling modern light from a large Gramme magneto-electric machine worked by a steam-engine—the germ beside its latest outcome. Faraday knew that the tiny spark could be made the means of illuminating lighthouses and great buildings and ships at sea, but he left that to other men. "I have rather," he says, "been desirous of discovering new facts and new relations dependent on magneto-electric induction than of exalting the force of those already obtained, being assured that the latter would find their full development hereafter."

A few months after his discovery, M. Pixii, an instrument maker in Paris, constructed the first magneto-electric machine. It was very simple, and consisted of a magnet rotated in the neighbourhood of a coil. Since then scores of electro-magnetic machines have been invented, the original form being gradually improved by a process of development curious to note, each new form *growing*, as it were, out of the old, until at last they have culminated in the powerful and economical machines of Wilde, Siemens, and Gramme. These machines are usually driven by a small steam-engine of a few horse-power, and part of the energy of rotation is transformed into a continuous current of electricity, capable of supporting the most brilliant electric lights.

But although the invention of magneto-electric machines overcame the difficulty of inconstant and expensive batteries, the second defect—that of the wasting of the carbon points, or *wicks*—was more baffling. Various mechanical lamps were contrived to regulate the distance between the points by giving them a motion towards each other in proportion as one of them was worn away. Of these Dubocq's is the best, and very ingenious it is. The current itself is made to regulate the distance between the points by means of a magnet, so that when the distance gets too great for the current to pass, the points are brought closer, and when they are too close they are drawn farther apart. Instead of these regulators, divers materials were from time to time substituted for carbon as points, or "electrodes," for the arc: Points of platinum, of iridium, of silver, and other solid metals, were tried, but the vivid colours these give to the flame stand in the way of their adoption. A fine stream of fluid mercury, falling on a solid surface of metal or carbon, yielded a superb green light. One rather successful plan was to give the carbons a rotary motion, so that a fresh surface was continually being opposed to a fresh surface. Various methods were invented for preparing the carbons, so as to keep them as pure and steady in burning as possible. Carbons cut from gas retorts, or prepared from wood charcoal, or manufactured from tar, resin, or mineral oil, are found to give the best light. But even the best of these is imperfect as a constant source of light; there is always a certain flickering of the luminous

are as it plays over the wasting points, and a variable intensity of the illumination. Nevertheless it does not seriously interfere with the use of the light as a great illuminating centre, such as a lighthouse or beacon-light, where there are several sets of carbon points and the light is collected by reflectors and sent out in parallel rays through elaborate lenses. The splendid beam which the South Foreland lighthouse sends over the Channel appears as equal and steady as it is brilliant. When, however, we come to lighting on a smaller scale, as in streets and public buildings, the case is different. The management of small carbons is difficult; they give a variable and an undiffused light; and, in addition to this, it is not easy to distribute or divide the current amongst a number of arcs such as would be necessary in the case of street-lamps or the different rooms of a building.

The electric light of M. Lodighin, a Russian engineer, was a great improvement over the ordinary carbon points. Lodighin encloses a single stick of carbon in a hermetically sealed glass vessel full of nitrogen, and sends the current through it. It thereupon glows at a white heat, emitting a steady, soft light, and as there is no oxygen in the vessel, there is no combustion of the carbon, which therefore remains unaltered. The current is supplied by a Gramme's machine. It is designed for the lighting of streets and houses, and, by successive public trials at St. Petersburg, Paris, and London, achieved considerable favour a year or two ago. It has very recently, however, found a more powerful rival in Jablochkoff's electric candle. Like Lodighin, Jablochkoff also procures a steady light without the use of any kind of regulator. The candle consists of the usual pair of carbon points, but instead of being pointed to each other they are placed side by side and separated from each other by a strip or plate of

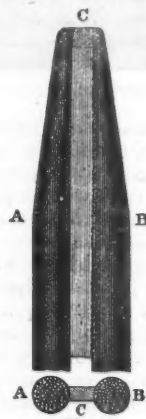


Fig. 1.

kaolin or porcelain clay, thus (fig. 1), where A and B are the carbons, and C the kaolin. The candle stands upright in a socket or candlestick, and the current being sent up the stick A crosses the top of the kaolin C and flows down the stick B. To start the light the current first passes through a strip of conducting composition, C, between the two carbons across the edge of the kaolin. Between A and B is the luminous arc, or candle flame, a brilliant centre emitting a delightfully soft and continuous light. It owes its peculiarly soft diffusiveness to the kaolin, which is heated to whiteness at the tip and melts away like wax at the same rate as the carbons are consumed.

The edge of a simple plate of kaolin may also be heated by the intermittent current from an induction coil without the use of carbons at all, and a beautiful band of soft white light produced. For large open spaces, such as railway-stations, areas, harbours, public-halls, and thoroughfares, Jablochkoff's candle is very well adapted, and with some improvements the simple kaolin light may yet come to be fitted for domestic use. The great advantage of Jablochkoff's system is that there is a constant and continuous circuit for the current across the luminous kaolin. The variableness of the voltaic arc is thus to a great extent avoided, and no lamp to regulate the distance between the carbon points is required. Electricians are now beginning to see that the electric light of the future is one which will be produced by some substance, metal or rock, which will become luminous on the passage of an electric current *through its mass*. The uncertainty of a break in the current, which holds in the case of the opposed carbon points with the "voltaic arc" of Davy between, will thus be obviated. Both Lodighin and Jablochkoff did good service in departing from the old groove, and providing a *continuous* conducting circuit for the current, Lodighin with his carbon stick in vacuo, and Jablochkoff with his compound candle of carbon and kaolin. These gentlemen have partially succeeded, but their apparatus is still somewhat complicated, and the best solution of the problem of electric lighting will only be attained when the immediate source of light is a single piece of some material inserted in the circuit of the current. This material has, it appears, yet to be discovered.

The electric generator of the current employed by M. Jablochkoff is a Gramme or dynamo-electric machine, which gives rapid alternations of positive and negative currents. A dynamo-electric machine is simply a magneto-electric machine, in which the magnets generating the currents are not bars of steel permanently magnetised, but bars of soft iron made temporarily magnetic by a current of electricity circulating round them. In most dynamo-electric machines this magnetising current is supplied by the working of the machine itself from a trace of permanent magnetism in the bars to begin with, but in the form of Gramme machine used by M. Jablochkoff this current is obtained from a separate Gramme machine of the ordinary kind. Our figure 2 shows the arrangements required for lighting Jablochkoff's electric candle. A is a small Gramme machine of the ordinary kind, which supplies the current necessary to magnetise the electro-magnets of the alternating machine, B. This latter machine generates short positive and negative currents alternately, some 16,000 of them per minute. These currents are led by wires, EE, to the "commutator," C, and from the commutator by other wires, EE', to the lamp. In each lamp there are four separate candles, but only one burns at a time. The current passes up one carbon, traverses the kaolin, and down the other; and if the current were always in one direction, the positive carbon, or that connected to the positive pole of the machine, would be wasted away much faster than the other; but by the device of alternating the currents the carbons are alternately worn away at an equal rate. Each candle only burns one hour and a half, but the commutator serves automatically to turn the current into the next candle the instant that the last has burned sufficiently low. In this way the four candles burn

six hours. The dynamo-electric machines, A and B, are of course turned by a belt from any shafting

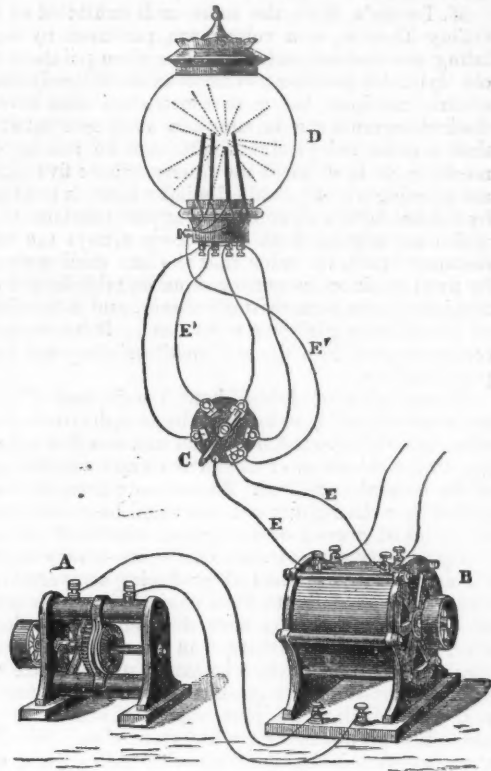


Fig. 2.

driven by steam or other motive-power, such as water-wheels or gas-engines. By a particular arrangement of the interior of the machine, eight, ten, or even sixteen separate lights may be fed from one machine, but the usual number is six.

M. Jablochkoff's light occupies by far the most prominent place of any now before the world. Visitors to Paris during the past summer have seen it at twenty different places in that splendid city, glowing in large opal globes, with a soft, pale radiance like that of the full moon. The chief display, however, is to be seen in the Avenue and Place de l'Opera, where twenty-four splendid lamps illumine the fine new boulevard leading up to the Grand Opera House. The example set last summer by Paris is being followed by other cities. St. Petersburg, Madrid, Copenhagen, and London, are practically taking up the question of electric lighting and trying it on an experimental scale. With our customary energy, now that it has once got a footing amongst us, thanks in great part to the enterprise of Mr. John Hollingshead, of the Gaiety Theatre, in bringing the Lontin electric light from Paris to the Strand, we English are rapidly outstripping the French themselves. Several new lights have been brought to the front, and trials of them take place every other day; ware-rooms, works, and shop-fronts are lit by it; football and polo matches played; the Thames Embankment, the Holborn Viaduct, and Billingsgate Market, among other places, have been publicly lit by one or other system, chiefly Jabloch-



koff's. Electric lighting companies have been formed, and dozens of patents for electric lighting have been taken out all within the last three months.

M. Lontin's light, the same as is exhibited at the Gaiety Theatre, is a voltaic arc, produced by regulating the distance between two carbon points in the old style. Its peculiar novelty consists in the dynamo-electric machine being so constructed that several distinct currents can be simultaneously generated so that several independent lights can be fed by one machine, as is done at the Gaiety, where five lights are glowing nightly. M. Rapiéff's light is produced by the arc between two *pairs* of opposed carbon sticks, which are regulated so as to keep always the same distance apart, in order that the arc shall preserve its fixed position in space and an equable brilliancy. Rapiéff's light is exceedingly steady, and is the finest of all of those giving a voltaic arc. It has been recently adopted into the "Times" printing and composing-rooms.

These lights of Jablochkoff, Lontin, and Rapiéff are very powerful, and give a single light equivalent, when naked, to from 500 to 1,000 wax candles, according to the thickness of the carbons and the strength of the current employed. To moderate their intensity and diffuse the light more, it is usual to enclose them in globes of ground or opal glass, which cut off from thirty to sixty per cent. of their light—a very wasteful amount. A method of producing comparatively small and naked lights, thus obviating the necessity of wasteful globes, has been devised recently, however, by Mr. Werdermann\* in London, and by M. Emile Reynier in Paris. In this method the electric light is formed by the incandescence of a fine carbon rod, as in Lodighin's plan, and not wholly by an arc, although a smaller arc is formed also. Werdermann's system is decidedly superior to Reynier's, and consists in pointing a fine pencil of carbon upright against a block of carbon held over it. The current is passed from the pencil to the block, and about an inch of the point of the pencil is caused to glow with a beautiful, pure, soft, and brilliant light like that of the sun himself. A very small bead of light is also formed in the minute arc between the two carbons; but there is no flickering; the light is quite steady, and all the regulation required is to arrange for the pencil of carbon being pushed up towards the upper carbon as it slowly consumes away. There being little or no arc, the resistance of the carbons to the passage of the current is very slight, and at least ten forty-candle lights may be kept going by a single current from a small 2-horse power Gramme machine of the ordinary type. The carbon pencils last for several months before fresh ones are required, and the intensity of the light can be greatly regulated by their size. Werdermann's light is perhaps the nearest approach yet made to the effectual subdivision and moderation of the electric light for household purposes; but although it will serve excellently well for lighting concert-halls, ware-rooms, and large counting-houses, it will require further development ere it can be introduced into dwelling-houses as gas is at present. Carbon under the electric current sometimes throws off red-hot sparks, and this alone, not to speak of the extra trouble of a more complex lighting arrangement, would, we fear, debar it from use in sitting-rooms, even if the light could be still further reduced in intensity.

\* For detailed descriptions of Rapiéff's and Werdermann's lights, see the "Electrical Review," for Nov. 1 and 15, 1873.

Mr. Edison has not fully disclosed his plan of general electric illumination, but we have gathered that it consists in forming the wick or luminous source of platinum, rendered incandescent by the current. This is an old idea, and Mr. Edison must have some further devices in view, else his reputed invention is worthless. He is, admittedly, a great inventor, and is now devoting himself so earnestly to the subject, that we need not be much surprised if he should succeed ultimately in doing what he has proposed, namely, to bring the electric light into our homes.

The fundamental difficulty in economically subdividing the electric light is the fact that the intensity of a light produced by a current of electricity is proportional, not to the simple strength of the current, but to the *square* of the strength of the current—that is, a current of twice the strength of another current will yield a light not twice, but four times as intense; and a current three times as strong will yield a light nine times as powerful. Similarly, on dividing a single current giving one light into two light-giving currents, each of half the strength of the original current, the two lights obtained in this way will each be only one-fourth of the original single light; and if the current be divided into three separate streams, three separate lights will be got, but each of them will be, not a third of the original light, as might be supposed, but only one-ninth, and so on. Thus a single electric light of a thousand candle-power would, on subdivision in this way, only give ten lights each of ten candle-power, or a hundred lights of one candle-power. From this we see that while the electric light is eminently suitable for the production of intense lights—and for this purpose it is cheaper than gas, as well as better—for small lights it is not only practically difficult to deal with, but theoretically wasteful. The Jablochkoff system of lighting is the most expensive of all, and is, for London, quite as dear as gas, although it gives a finer light; but the Lontin and Rapiéff and Werdermann systems are several times cheaper than gas for equal amounts of light, the Lontin being estimated at six times cheaper—even including the loss caused by employing opal globes. But this comparison is based on the use of a few powerful electric lights, and as we have seen how the intensity of the electric light is diminished by subdivision into separate lamps, we must infer that, according to our present knowledge, the electric light will not be able to compete with gas for household purposes at least for a long time to come. For the larger illuminating purposes of streets, lecture-halls, and ball-rooms; for ships, light-houses, buoys, trains, workshops, and harbours; for agricultural or building operations by night, and many other works, it will soon take the place of gas; but the study, the kitchen, and the drawing-room are likely to remain under existing plans of lighting.

#### ORANGES.

RIPE fruit, some philosopher has affirmed, is just so much condensed sunshine. We will not scrutinise the statement too closely for fear that, like a great many other very profound utterances of very wise men, it should turn out to be rather a foolish one. The idea is at least a pleasant one, and, with regard to the piles of oranges that brighten up our

MARSEILLES QUAY AT THE CHANGE SEASON.



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dingy streets all through our dreariest months, not very difficult to accept.

Just when trees are shivering off their last leaves, and fogs begin to grow dense and cold, and our weather generally assumes its wintry gloom and discomfort, shiploads of these cheery-looking little misaives pour in upon us, telling of clear blue skies and balmy breezes, and fairy scenes of beauty and fertility—every orange of them looking the veritable embodiment of sunbeams.

Every orange, we have said, but this is not quite correct. Look at these chalk-marks scrawled on the wooden boxes in which the fruit arrives. "'C' stands for singles," explained a good-humoured, rough-and-ready fellow to whom the writer once applied for information in the neighbourhood of Billingsgate—" 'C' stands for singles and is the primest, 'C C' for doubles and isn't so good; 'short crosses' is wuss still; 'middlings' is still wusser; and 'long crosses' is the wusset of the lot—regular rotten." Very little sunshine embodied in some of them, to all appearances; and if ever they have a chance of radiating a little cheerfulness, it will probably be when little ones assemble round some breakfast-table, to see the cover removed from a pot of marmalade made of "the finest Seville oranges."

These chalk-marks are scribbled on each chest as it is hauled up from the hold of a vessel moored just below London Bridge, where all the oranges that come into the port of London are unshipped, and conveyed to the warehouses of three fruit-brokers, through whose hands the entire trade passes. Each box is hauled up, subjected to a momentary examination, hastily marked according to the quality of its contents by the agent of the broker to whom the cargo is consigned, and away it goes on the head of some stalwart porter, professional or amateur. Almost anybody with a good thick cranium and a stout pair of legs may take a turn at fruit-porterage when oranges begin to come in. The work is usually very jealously reserved for a limited number of men who are members of a City Company known as the Fellowship Porters—a very ancient body. The professors of this "mystery" were incorporated as early as the reign of Henry II, and were re-incorporated in 1603. They have a hall of their own, and a governor and deputy-governor, and, as we see, very valuable exclusive privileges so long as they choose to hold them exclusively. When the Christmas fruit begins to pour in, however, there is more than enough for all the regular hands to do, and then any enterprising person to whom, as we sometimes see it expressed in advertisements, "salary is not so much an object as active employment," will usually find it easy to get taken on by the warden of the company. Having obtained his sanction, he has only to don a porter's "knot"—one of those huge pads for the head to be seen everywhere in the neighbourhood of Lower Thames Street—and go and put his head down at the proper place, and he will be entrusted with a burden for which, as he passes on shore, he will receive a ticket representing twopence, threepence, or fourpence, according to the nature of his load. At the end of the day these will be cashed, a certain percentage being deducted as the dues of the company, who guarantee the safety of the packages in transit from ship to warehouse. As seen from London Bridge, the continuous streams of white boxes and barrels going forth from the hold of a vessel, threading their way hither and thither among the crowd, across planks,

creeping up the face of the quay, and disappearing into the passages and alleys beneath the maze of buildings between Billingsgate Market and the bridge, suggest the idea of so many ants making off with grains of corn. As encountered in Thames Street, however, the similarity is not quite so obvious. A chest of oranges mounted on a stout pair of legs, and stimulated to lively activity by "threepence a turn," constitutes a kind of battering-ram very well calculated to upset any little play of the imagination when encountered by an adventurous explorer into the neighbourhood; and when they come five-and-twenty or so in a string it is easier to fall in with them than to make headway against them. Instead of going down to the vessel, therefore, we will turn, and go with the porters across Thames Street, and climb some of the steep, perilous-looking ladders leading to the different floors in the warehouses in or near Pudding Lane, close under the Monument. It is not altogether a pleasant adventure for a stranger, who happens to know that some of the bearers of those heavy chests may be new to the work. As he climbs the almost perpendicular ladders, and looks up at the soles of several pairs of boots, which he fancies are slipping about, and at several pairs of knees, which seem to be tottering under their burdens, it is evident that the merest trip and there would be a general getting downstairs, terminating in a promiscuous heap of splintered boxes, smashed oranges, old clothes, and broken bones. When we reach the floor to which the cargo is being conveyed, the broker's assistant, standing at the head of the stairs, directs each man in what part of the floor to deposit his burden, according to the chalk-marks it bears. Thus the shipload of fruit is roughly sorted—very roughly indeed it appears to the uninitiated—samples are taken out for display in a room set apart for the purpose, and catalogues are drawn up in readiness for the next sale day, when, at the time appointed, a man perambulates the immediate neighbourhood of the sale-rooms with a small hand-bell summoning buyers to assemble.

We will go into the sale-room presently. A far pleasanter place than that is the sample-room, around which are representatives of all the most delightful regions of the earth, and from which one who has no commercial interest in the fruit finds it easy to wander in imagination away under deep blue skies, through shady groves, and valleys of almost fadeless bloom. Here are figs from Faro, pineapples from the West Indies, grapes from Almeida, cob-nuts from Messina, dates from Bussorah, and oranges which never grow to perfection except where earth is more or less of a paradise—a region of beauty and fragrance, of clear blue skies and flooding sunshine, where bleak winds never blow, cold rains never fall, and where verdure and bloom are perpetual.

We are indebted to many parts of the earth for this popular fruit. Of late years we have imported a good many from America, some we get from Sicily, a good many from Spain and Portugal, while about half our supply, it has been computed, comes from the Azores. The sunny slopes of Southern Spain are everywhere famous in the accounts of travellers, who tell us of snow-capped mountains sheltering valleys of the most enchanting beauty, where picturesque, bandit-looking rustics labour among vast plantations of orange-trees, five-and-twenty or thirty feet high, laden not only with fruit in every stage of

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maturity, but with delicately-perfumed blossoms such as in this country we have tenderly to nurture beneath glass, and can employ for decorative purposes only at weddings or on other equally rare occasions. Nothing, we are assured, can be much more charming than some of the orange-gardens of the valley of the Guadalquivir, among which are the famous grounds said to have been originally planted by the Moors, and which from their time till now have continued to supply that particular kind known everywhere as the Seville orange. This has a decidedly bitter flavour, and is for the most part used for making marmalade or candied orange-peel. But Spain grows the sweet kinds also in great abundance, sending a good many to us, shipping them in as well from her own Mediterranean shores to those of France, through the port of Marseilles, the centre of nine-tenths of the French trade of all kinds with the Mediterranean.

Oranges commence to arrive at Marseilles towards the month of December. Their picturesque unloading merits a special description.

The bell rings for work to begin. The Genoese portresses (*porteires*) run along planks, which, suspended at one end from the deck of a Spanish felucca, lean on the other upon the stones of the quay, carrying baskets laden with fruits shining in the sun, with that grace and peculiar motion of the body so characteristic of them. Some go, others come with equal rapidity, but not without exchanging a word of jest with each other as they hurry along.

In proportion as the sacks and the baskets on the quay get filled the buyers come, the carts draw up, and the sight-seers stop to look. Then, when the Custom-house has made its first weighings, the shore-men (*hommes du bord*), used to laying hold of three or five oranges in each hand, bend down, and counting the fruit, as with the rapidity of steam-driven machinery, each do their part, satisfying everybody at once.

The oranges exercise an irresistible attraction over the passers-by; the sight is so agreeable, the smell so sweet, and the taste so delicate, that no one can resist the temptation of consuming some on the spot. In Marseilles no one is ever prevented eating an orange on the quay any more than he would be swallowing a dozen mussels.

From all time the commerce in oranges has prospered in Marseilles; it was even more flourishing in former times, when three-fourths of the harvest from the Mediterranean coasts and the Spanish islands found their way to its port. Oranges then were sold at so low a price that the people pitched them at each other's heads as elsewhere they throw snowballs. Bad actors in the Marseilles theatres were sometimes exposed to quite a storm of oranges.

France grows a good many oranges for herself in the sunny provinces of the south, but she has also to import largely, for the fruit is very popular in that country. It has been asserted that in Paris alone three millions of oranges are presented as New Year's gifts every year.

We have incidentally referred to what has often been spoken of as a very peculiar characteristic of the orange-tree—that it bears fruit in various stages of maturity, and blossoms at the same time. As a matter of fact, the orange-tree blooms only once in the year, but when the fruit is not intended for exportation it is allowed to remain on the trees to ripen thoroughly. Last year's fruit will thus often be found hanging, ripe and ruddy, with this year's

blossoms, and very frequently long after the most forward of the flowers have given place to young oranges. The common notion that orange-trees bear flowers and fruit all the year round is quite erroneous. Fruit intended for shipment abroad is not allowed to hang on the tree until it is ripe; it is gathered just as it begins to turn yellow into baskets lined with canvas. The gatherers are mostly women, who go about their work with their wicker receptacles strapped on to their backs, the fruit being dextrously thrown over their shoulders into them. When the baskets are full they are emptied into boxes placed here and there under the shade of the trees, and in these boxes they are carried to the "magazine." Here they are sorted by experienced women, and young girls wrap each orange in a slip of paper or a leaf of maize, and pack them in what are known as chests or half-chests, the chests containing one thousand oranges. This is the mode of packing in Spain and Portugal, all exported fruit being dispatched with a good deal of its ripening to do *en voyage*. Oranges with a tinge of emerald green upon them are not unfrequently seen in our streets in the early part of the season; the journey to this country has scarcely been long enough to permit of their ripening fully.

The "sweet St. Michaels" are the best oranges sold to any extent in our market. They are from the island of St. Michael, one of the Azores, which a few years ago sent us, it was computed, not less than £100,000 worth per annum. This sunny island may be considered the favourite haunt of the orange, though it is so exposed to boisterous Atlantic winds that the quintas, or orange gardens, have to be protected by lofty walls and plantations of cedar, birch, and other trees. "Nothing," says Captain Boid, "can exceed the rich, luxuriant appearance of these Hesperian gardens during the principal fruit months—from November to March, that is to say—when the emerald tints of the unripe, and golden hue of the mature fruit, mingle their beauties with the thick dark foliage of the trees and the bright odoriferous blossom which diffuses a sweetness through the surrounding neighbourhood, quite delicious."

As we have already said, the ripe oranges on the trees are those not intended for exportation. The inhabitants of St. Michael live to a very considerable extent on their fruit, which is the principal product of their island. Boid mentions a curious display of epicurism among the upper classes here. He says they eat only that side of the orange which has been most exposed to the sun, and which in fresh fruit is quite as easily distinguishable as in our apples. The trees here are said to be wonderfully prolific. They are propagated from layers bent down and covered with earth, until they throw down a few rootlets, when they are separated from the parent tree and set in small plantations. So delicate is the orange-tree, however, that though the temperature of St. Michael never ranges farther than from about 50 deg. to 75 deg. Fah., these young offsets have to be planted in little hollows some three feet deep, and surrounded by ferns or shrubs, and a pile of the loose pieces of rock with which the soil abounds. Thus protected, they soon make stout young trees, and are then removed to the positions they are destined to occupy permanently. In this genial spot it is said that they will attain a good fruiting condition in seven or eight years, whereas in most European orange-gardens from sixteen to twenty years are

required for young trees to attain the same stage; and not only do they bear very early, but the crops are sometimes enormous. It is said that a single tree has been known to produce 26,000 oranges when at its prime. This, however, if a fact, is quite exceptional, though it has been asserted on good authority that from 12,000 to 16,000 oranges are not an uncommon crop for a tree in St. Michael. In Spain or Portugal 3,000 or 4,000 are thought to be very satisfactory crops. The St. Michael oranges come into the market packed like the Spanish fruit, in chests and half-chests, containing 1,000 and 500 oranges respectively, and in Pudding Lane, to which we will now return, will realise from 30s. to 50s. a chest.

The time for the sale to commence is of course announced on the catalogues; but in addition to this, as we have said, the curious custom prevails of sending round a bell-man, who perambulates the streets in the vicinity of the sale-room, vigorously ringing in buyers of all sorts and sizes. There are, of course, large dealers who come to buy considerable quantities of fruit, and many of them have the appearance of well-to-do tradesmen. The majority of those who answer the summons of the sale-room bell, however, are characterised by the croppy head, the "plentiful lack" of shirt-collar, and the rough husky voice of the London costermonger, who comes here in hopes of finding an odd chest or box within his mark when the abler buyers have had their pick. Such as we are, however, we all crowd in and pack ourselves as comfortably as we can into a convenient little sale-room, constructed in the heart of the block of premises lying between Lower Thames Street and Eastcheap one way, and between Botolph Lane and Pudding Lane the other. On one side of the room there is a kind of tribune for the broker and his clerks, and on the other are seats raised one behind the other, after the manner of a lecture-hall. Into those seats we squeeze ourselves—a jovial, good-humoured little throng, a good deal given to Billingsgate "chaff" and rank tobacco, which speedily fills the place with clouds of smoke. This, mingled with the heat of the gas, in a closely-packed room, and the very pronounced odour of corduroys and stale fish, renders a fruit-sale rather a trying experience to a novice. There was a time when matters might have been even more trying. The time was, it is said by those who have been many years in the trade, when rotten fruit and packets of flour were among the difficulties with which a buyer had to contend in securing any lot on which he had set his heart; but that sort of thing has been given up, and beyond a good deal of shouting and uproar, and a propensity to tease a vanquished opponent, there is nothing very remarkable in the proceedings at this auction sale.

This is one of three similar rooms through which, as we have intimated, the London orange trade passes. That trade, it is computed, comprises about a third part of the entire imports of the kingdom. At one time it would have been easy to speak with precision on this subject. There was formerly an import duty of about 1s. a hundred on oranges—2s. 6d. a box was the precise duty, the box being the Sicilian package, containing about 250 oranges—and it was then, of course, easy to obtain precise particulars of the importation by referring to the Customs returns. In 1853 this duty was reduced to 8d. a box, and in 1861 it was abolished altogether. Since then the only authoritative figures published with respect to

this business have been those in the annual return made to the House of Commons by the Board of Trade, and in this we have lemons included with the oranges. Some idea of the magnitude of this minor item in our imports, however, and of the great rapidity with which it has grown, and still continues to grow, may be gained from this report. In 1858 the oranges and lemons imported into this country amounted to 972,653 bushels, having a value of £525,970. In 1867 imports had risen to 1,453,566 bushels, worth £744,732; and in 1877 the figures stood at 3,533,781 bushels, having a value of £1,549,765.

About a third part of this fruit, it is thought, comes into London, and of that third part somewhere about a quarter is distributed by the costermonger. It is a mistake, we are assured, to suppose that these hardworking members of the community buy only inferior kinds, or fruit in bad condition. They make their money by taking advantage of a temporary glut in the market, sitting patiently on auction days—Mondays, Wednesdays, and Fridays—ready to pounce on whatever is in excess of the requirements of the upper-class trade.

The days we have mentioned are those on which auctions are invariably held, unless they happen to be Jewish holidays or fast days. Then a change is made, for the Jews are among the most important buyers, and assist very largely in the distribution of the fruit, not only retail, but wholesale. There is a little corner of the world known as Duke's Place, just close to Aldgate Pump, where an immense trade is carried on between the wholesale Jewish dealers and the smaller fry of the trade. To this spot almost all the costermongers of London are in the habit of resorting when they fail to find any opening for their capital in the auction-room. The busiest hours of the week here are the hours of Sunday morning, and it is then that the place is to be seen in all its hubbub and activity. Visitors describe the strange contrast one experiences as, after passing along Fenchurch Street or Leadenhall Street, where shops are all closed, and pedestrians dressed in their best are quietly wending their way to church and chapel, as bells tinkle and chime peacefully up in the bright morning sunshine—the stranger turns abruptly into this crowded, bustling, filthy little nook, and has to push his way, nearly ankle-deep in mud composed mainly of rotten fruit trodden down with maize leaves, into the thickest of the market. The place is not altogether wanting in a certain charm—the glowing piles of oranges, the heaps of shining chestnuts, and masses of luscious grapes lending a brightness and beauty to the dingy little locality which even its dirt and squalor, and the hoarse hubbub, the coarse noisy vulgarity of its *habitués*, cannot altogether neutralise. Oranges may, it is said, be usually bought here cheaper than in any other wholesale market in London; and a difference of threepence a hundred is quite sufficient to attract the costermonger from all parts of the metropolis.

We have almost overrun the space allotted to this article, but there is just one point suggested by our subject to which it may be useful to devote a few lines more, and perhaps we cannot do better than by quoting a paragraph which some years ago was given in the "Times" newspaper as a quotation from a book of travel written by that old story-teller, Sir John Mandeville. He was, he is made to say, once in the parts beyond India "which merge on

the realm of Prester John," and he fell in with a city in the midst of orange groves. "In that city," says the story, "I abode many days in great ease, and refreshed myself often with those oranges. But now hear a marvel. One morning, as I looked from the lattice of my window, I beheld a woeful wight led through the street, with a great company of folk at his heels, who with one voice shouted out, 'Toko! Toko!' which in their tongue signifieth death. When I, nothing doubting that he had wrought some great wickedness, demanded of the people what evil he had done, they made answer, one and all, 'He is guilty of death, for he hath thrown orange-peel on the pavement and caused our high-priest to fall down and break his leg.' Whereupon, much musing—first on the fitness of the punishment, and next on the great love which these ignorant folk bear towards their archbishops—I followed the crowd to the gallows hill, where I presently saw this great transgressor neatly impaled." The quaint old traveller is made to express his confidence that, should this pleasant fruit ever come to London town—"all unlikely though it be"—the Lord Mayor and Aldermen would be sure to take care that "if any idle apprentice or any of the townsfolk" ate oranges and threw the peeling on the pavement, the offender should be sure to meet with prompt retribution—"not, indeed, by impalement, for that savoureth of Eastern customs; but as our laws, as befits a Christian land, are more merciful than those of the heathen, by pillory for the first offence, and by hanging by the neck for the second. For albeit that the orange is a refreshing fruit, it were absurd and clean against reason and kind that any archbishop, or a chief justice, or even a bishop or a puny baron, should be thrown down and break his bones by reason of the carelessness of such idle orange-eaters."

The passage does not occur in Sir John's travels, and the "Times" paragraph appears to have been only a clever skit by some wag of the day.

But whatever may be the value of the narrative, we quite agree with the opinion that the authorities, not only in London, but in all places that have attained to the dignity of pavement, ought to make it a penal offence to imperil the bones of pedestrians by throwing orange-peel upon it. We would hardly go so far as to hang a person for the second offence, but we would most certainly inflict a fine even for the first.

## A GOSSIP ON WIGS

AND THE WIGS OF WESTMINSTER ABBEY.

II.

THE works of Hogarth constitute a fine collection of wigs. Hogarth lived and worked during the time when the empire of the wig was in the ascendant; and, indeed, our readers learned in the works of the great painter may remember that he satirised the fashion, in his own way, in one piece called "The Five Orders of Periwigs, as they were worn at the late Coronation, Measured Architectonically." The print was intended as a severe satire, and by the advertisement which accompanied it, the great painter seemed to express a prophecy that the absurd practice would speedily suffer a decline. "In about seventeen years will be completed, in six volumes

folio, price fifteen guineas, the exact measurements of the periwigs of the ancients, taken from the statues, bustos, and basso-relievos of Athens, Palmyra, Balbeck, and Rome. By Modesto-Periwigmeter, from Lagado [our readers will remember Gulliver's Travels]. N.B.—None will be sold but to subscribers. Published as the Act directs, October 15th, 1761." But Hogarth's works, as we have intimated, abound with illustrations of the wig—the wig episcopal or parsonic, the wig legal, the wig aldermanic, and what he calls "the wig composite," or half-natural, and the "Queerinthian," or "Queene de Renard," and many others. It is altogether impossible to do justice to the wigs of Hogarth; enough to say they enter essentially into the history of wigology.

Very early in the fashion bag-wigs came into general use; probably the style which we have seen engaging the affectionate interests of Mr. Pepys was something of this nature. An old writer, in 1737, speaks of the unnatural scantiness of the wig as compared with the bag, which was sometimes of huge dimensions, and so contrived as entirely to cover the ears; upon which this writer remarks, "I should very much doubt whether any of them would be gainers by showing their ears, for 'tis said that Midas, after a certain accident, was the judicious inventor of long wigs." This wig in full form appears to have been discontinued about the reign of George II, but it is quite plain, by the study of English portraits, that it only became attenuated to the more graceful proportions which meet us in some of the latest English portraits of the last century. We are reminded of a humorous description of himself by Cowper, in one of his letters to his cousin, Lady Hesketh: "As for me, I am a very smart youth of my years; I am not, indeed, grown grey so much as I am grown bald. No matter; there was more hair in the world than ever had the honour to belong to me. Accordingly, I have found just enough to curl a little at my ears, and to intertwine with a little of my own that still hangs behind. I appear, if you see me in the afternoon, to have a very decent head-dress, not easily distinguished from my natural growth, which, being worn with a small bag and a black ribbon about my neck, continues to me the charms of my youth, even on the verge of old age." This extract from Cowper shows that it is possible to combine some measure of individuality even with the use of the wig, and that a gentleman, even when yielding himself to that most universal of all vanities—the vanity of the hair—will betray a character which leaves nature, in some measure, to take her own course.

We suppose it will be admitted that the last age of the wig is, after all, the most contemptible in point of fashion—the scratch-wig—the lineal descendant, however, of that which has, for want of any better designation, been called by a writer in the "Quarterly" the George-the-Fourthian Peruke. Lest we should seem irreverent, we may quote this high conservative authority, who speaks of it as "an upstart sham among wigs, hideous, artificial, and gentry looking; its painful little curls haunt us. We scarcely ever see that type now in its full original horror, but bad is the best; it seems at first thought very odd that barbers cannot make a decent imitation of a head of hair." From this descended, we say, the scratch-wig, whose highest ambition consists in being like the natural hair; its aim is to make age look youthful, and to give to the baldness of Cicero



and Cæsar the beauty, if not of flowing locks, the reverse of the prophetic condemnation in the adornment of well-set hair. A lady once inquired of St. Francis de Sales if she might be permitted to wear rouge? He replied, "Some persons might object to it, and others may see no harm in it, but I will take a middle course by allowing you to rouge on one cheek." The modern wig seems "a middle course," as compared with the enormities of other ages to which we have referred.

Distinctive and characteristic wigs must, however, still be in the memory of the older folks of the present generation, especially those whose years half a century since were passed in the neighbourhood of Greenwich Hospital; there how frequently the eye was amused by the spectacle of that object of the pride of our ancient tars, the long-tail, for although "Jack" wore it from his own venerable tresses, of course it was a wig. Not that this fashion was confined to our "hearts of oak," or that it was uniform;

"There were long-tailed wigs, and short-tailed wigs,  
And wigs with a curly tail."

One well-known naval novelist, Captain Marryat, in his "Poor Jack," a story the scenery of which lies mostly round Greenwich Hospital, introduces a painful episode in which Poor Jack's mother, in a fit of revenge, cuts off in his sleep the long pigtail which was the pride of his father. Great was his grief, as he exclaims, "Well, I never would have thought it, had they told me that you and I would have parted company; many, many, years has it taken you to grow to your present length; often have you been handled; often have you been combed; and often have you been tied; many's the yard of ribbon which you have cost me; I thought we should never have parted on earth, and if so be my sins were forgiven me and I could show a fair log, that I might be permitted to wear you in the world to come; but there you are, parted for all the world like a limb shot off in action, never to be spliced again. What am I to say when I go on board? I shall have a short tale to tell instead of a long tail to show; and the wife of my bosom to do this!"

The custom of the long pigtail here quite surprised the Chinese traveller, Goldsmith's Citizen of the World, when he came to our shores, and he writes down his surprise in his letter to his friend in China: "One would think that some persons had an antipathy to the human form, and were resolved to make a new figure of their own; but let us do them justice, though they sometimes deprive us of a leg, an arm, a head, or some such trifling part of the body, they often as liberally bestow upon us something that we wanted before; many of the English wear tails in their wigs to this very day, as a mark, I suppose, of the antiquity of their families, and perhaps as a symbol of those tails with which they were formerly distinguished by nature." Thus Goldsmith ingeniously finds the symbolism of the pigtail wig in a kind of incipient Darwinism many years before Darwin expounded his theories.

Thus, if we were writing a concise account of the history and physiology of the wig, we should find how various were its phases, and how many the intermediate stages between the vast proportions of its earlier period and the gradual *diminuendo* to which it came. Those to which we first referred were

not only enormous, but enormously expensive, some of them costing so much as forty guineas each. If the light-fingered gentry of those old times found it worth their while to prowl about for silk handkerchiefs, we may be sure the stealing of a wig was a more profitable piece of larceny. An ingenious mode was for a thief to carry on his head a sharp boy in a covered basket, who in passing through a crowd would dextrously seize and conceal the most attractive-looking periwig. In fact, we suppose the thing was easily removed, and there is an odd story before us of Peter the Great of Russia, who was at Dantzic in the year 1716. On a State occasion he attended the church, and was placed on an elevated seat by the side of the burgomaster. The burgomaster sitting by him, but a little below him, the eyes of the congregation were, naturally, fixed on the Emperor. He appeared to be listening to the sermon, but, his head growing cold, he stretched forth his hand, very deliberately took the burgomaster's huge, full-bottomed wig, and put it upon his own head. Nor did he attempt to return it until after the service. It must have been an amusing spectacle—perhaps a pair of spectacles. There sat the wigless burgomaster, his venerable bald pate exposed to the subdued laughter of his fellow-citizens. The attendants of the Czar explained afterwards that his Imperial Majesty, being very short of hair, he was accustomed, when at home, in this way very frequently to borrow the head-piece of Prince Menzikoff, or any other nobleman who happened to be within his reach. It seemed an odd proceeding to the good folks at Dantzic. In Russia, had he taken the whim for removing the head as well as the wig, we suppose it would have been equally at his disposal. The humours of the Czar were very capricious, and sometimes far from pleasant.

Did space permit, some attention might be devoted to the sources from whence the great demands which were, perhaps are still, made for human hair were supplied. As in so many other articles, free trade in hair was necessary. In our paper on "Bonnets and Head-dresses" we referred to the very high prices which were paid for a handsome head of hair, and the self-denial some persons exercised in parting with their hair for substantial benefits. Dr. Wynter, in his interesting essay on Human Hair, quotes a passage from Mr. Francis Trollope's "Summer in Brittany," giving a very lively description of the manner in which the young girls of the country bring this singular commodity to the market as regularly as peas or cabbages. Possibly our readers have not seen it, and in that case cannot but be interested with the extract. Describing a fair at Collenée, he says, "What surprised me more than all, by the singularity and novelty of the thing, were the operations of the dealers in hair. In various parts of the motley crowd there were three or four different purchasers of this commodity, who travel the country for the purpose of attending the fairs and buying the tresses of the peasant girls. They have particularly fine hair, and frequently of the greatest abundance. I should have thought that female vanity would have effectually prevented such a traffic as this being carried on to any extent, but there seemed to be no difficulty in finding possessors of beautiful heads of hair perfectly willing to sell. We saw several girls sheared one after the other like sheep, and as many more standing ready for the shears, with their caps in their hands and their long

hair combed out and hanging down to their waists. Some of the operators were men and some women. By the side of the dealer was placed a large basket, into which every successive crop of hair, tied up into a wisp by itself, was thrown. No doubt the reason of the indifference to their tresses on the part of the fair Bretonnes is to be found in the invariable mode which covers every head, from childhood upwards, with close caps, which entirely prevents any part of the hair from being seen, and, of course, totally conceals the want of it." So that, probably, the removal of the hair was rather a relief to the wearer, but the most affecting part of the story is in the price which these young daughters of Brittany received for their coveted possession. "The money," continues Mr. Trollope, "given for the hair is about twenty sous, or perhaps a gaudy pocket-handkerchief." This is probably one of the most innocent sources from whence the wig was, or is, derived.

But if we proceed much further, our paper will become too divergent, and reach the length of the discourse of that worthy pastor of Wernigerode, who, taking for his text the words (Mat. x. 38), "The very hairs of your head are all numbered," found that the consideration of it naturally divided it into three parts. "First," said he, "let us consider our hair, its origin, style, form, and natural circumstances; second, we shall proceed to discuss the question of the right use of hair; and, third, by way of application, we shall advance to the memories, admonitions, warnings, and consolations which have come from human hair, and attempt to discover how it may be used in a Christian way." This was exhaustive, and we dare not attempt to dilate so amply.

We have not felt at liberty at all to touch upon the classical department of our subject, else we might have found illustrations enough, and especially from the Latin poets; and almost all the modern implements connected with the decoration of the head or hair have been found in the ruins of Pompeii. The more ancient mummies of Egypt might also have supplied curious matter about wigs. Nor have we touched upon any of the lessons which meet us in Scripture, either of Samson or of Absalom, "that princely young scoundrel," as one calls him, and of whom old Trap, the Commentator, says, "God made his hair his halter. Those tresses that had formerly hanged loosely, dishevelled on his shoulders, now he hangs by them. He had wont to weigh his hair, and was proud to find it so heavy; now his hair poiseth the weight of his body, and by the head he hanged which had plotted treason against his father, and his pleasant burden became his torment."

We conclude with an amusing incident told by the well-known missionary, John Williams, the "Martyr of Erromanga":—

A few years ago a venerable and esteemed brother missionary came to England, and, being rather bald, some kind friends provided him with a wig. Upon his return to the islands, the chiefs and others went on board to welcome him, and, after the usual salutations, one of them said to the missionary, "You were bald when you left, and now you have a beautiful head of hair. What amazing people the English are; how did they make your hair grow again?" "You simple people," replied the missionary, "how does everything grow? Is it not by sowing seed?" They immediately shouted, "Oh, these English people! they sow seed upon a bald man's head to make the

hair grow!" One shrewd fellow inquired whether he had brought any of the seed with him! The good missionary carried on the joke for a short time, and then he raised his wig. The revelation of his "original head" of course drew forth a roar of laughter, which was greatly increased when one of the natives shouted to some of his countrymen who were near, "Here, see Mr. —, he has come from England with his head thatched! he has come from England with his head thatched!"

## Varieties.

THE DUKE OF ST. ALBANS ON EDUCATION.—In presenting the prizes in connection with the Nottingham science classes last autumn, the Duke of St. Albans said we must feel proud at the triumphs of our commerce and our industry, which had placed us foremost among the nations of the earth; but he would remind his hearers that Continental nations were prepared at this moment to attack that supremacy. He was astonished the other day to hear one of the leading bankers in the metropolis say that he was able to engage three German clerks for the price of two English ones, and that these Germans were able to speak four languages. He thought the advancement which had been made in educational matters on the Continent was a grave matter for consideration. It was no argument that because genius in this country would show itself in a variety of ways and because we had talent in our midst, schools of art and science were unnecessary. It was more than ever necessary that we should have such machinery. If Englishmen were not furnished with a good elementary education, and if science was not put within their reach, English industry would be beaten out of the field.

STATISTICS.—Mr. Tallack, secretary of the Howard Association, says: "When at Stockholm I made some inquiry as to the startling statistics, often published, which appeared to prove that city to be one of the most immoral in the world, and was confirmed in my previous decided scepticism on that point by being informed by several authorities that, in various ways, the figures are illusive. Thus, to mention one direction only, all the children of Baptists, Methodists, and other Dissenters, of whom there are a considerable number in Sweden, are returned in the statistics as illegitimate, because their parents are not married with full Lutheran rites, although *de facto* religiously married by their own pastors."

THE YOUNG FRONDS OF THE BRAKE OR BRACKEN (*Pteris aquilina*) EXCELLENT FOOD FOR PIGS.—On the authority of Mr. James Babbage (the intelligent sub-agent to Sir Walter C. Trevelyan, Bart., at Nettlecombe, his interesting and beautiful seat in Somersetshire) we are able to state that the young fronds of the common bracken have been found excellent food for pigs. He says: "Walking over the estate one day in the spring I saw a man and his family busily employed gathering the young shoots of fern. On inquiry, I found they were intended for their pig. Having expressed a doubt as to the fern possessing any nutritious quality, the man said it was equal to potatoes, and that he would undertake to feed a pig with it alone, and at the end of a month produce the pig in as good condition as another pig that had been fed with potatoes." The way to prepare the fern is to boil, or rather simmer, it for two hours in an iron pot. When cold it forms a strong jelly. △

THE SPECTROSCOPE AND THE TRANSMUTATION OF METALS.—Mr. Norman Lockyer, F.R.S., has made the startling announcement that the sixty-four bodies, which at present stand in our text-books as the simple elements of which all terrestrial matter is composed, are neither more nor less than hydrogen at various degrees of condensation. The spectroscope has been the means employed in the investigations. It will be remembered that this novel analytical instrument was applied with great success by Dr. Janssen and Mr. Lockyer to investigate the constitution of the sun, and that the process was subsequently applied, with remarkable results, to the other celestial bodies, by Dr. Huggins. Strange hieroglyphics were detected in the coloured and streaked bands of light which these bodies yielded in the prism. The present experiments, by which Mr. Lockyer believes he has achieved his latest discovery, seems to have been made with

terrestrial metals in his own laboratory. In the presence of several eminent scientific men he is reported to have succeeded in effecting the transmutation of at least six of the metals. By a powerful voltaic current, he is said to have volatilised copper within a glass tube, dissolved the deposit in hydro-chloric acid, and then to have shown that the solution contained no longer copper, but calcium. By the same means nickel was converted into cobalt, and calcium into strontium.

The experiments astonished those who witnessed them, and were considered to be conclusive as far as they went. On the other hand, they have been received with incredulity in the scientific world at large. It has been pointed out that the evidence for so great a reversal of existing views is of that exclusively optical character which the spectroscope furnishes, as distinct from that which would result from a directly chemical or physical investigation. Metals which have hitherto yielded separate lines in given places in the spectrum are now compelled by Mr. Lockyer's process to coincide in position, and to yield only one common line. In other words, the refrangibility of the rays of incandescent metals has been shown under certain conditions to be equal instead of diverse, and this common refrangibility of rays is the only indication that the bodies under analysis are identical in their elementary composition. On behalf of Mr. Lockyer, it is pointed out that the results obtained are purely conformable to the laws of spectroscopy, which have never yet been discredited; and that astronomers, physicists, and chemists alike have hitherto agreed in accepting the indications of the spectroscope as to the constitution of solid, fluid, and incandescent bodies. Further, should such testimony be invalidated, of which at present there is no sign, many of the most brilliant of recent expositions as to the nature of the sun and the stars would have to be given up. Should, however, Mr. Lockyer's conclusion be verified, and the sixty-four elements be really reduced to less than the traditional four of earth, air, fire, and water, the past twelvemonth will have been a veritable *annus mirabilis* in the annals of science. The year is already remarkable for the abolition of the permanent gases, as they used to be called, MM. Cailliet and Pictet having recently liquefied almost simultaneously all gases of that description.

**EDUCATION OF MAORIS.**—A novel competition was held recently at the Portobello School, Otago, New Zealand, between the five best native Maori children attending the native school and an equal number of white children selected from the English school. The subjects for examination were arithmetic, including vulgar and decimal fractions, geography, writing, spelling, and reading. In dictation the native scholars were easily beaten; but in the next subject, arithmetic, they managed to score a total of twenty-two sums correctly rendered out of thirty, against fourteen of the same exercises given to the English children. In geography the competitors were closely matched, the advantage being slightly on the side of the natives. In writing the palm was again given to the Maoris, who were, however, beaten in oral spelling as they had been in dictation. On a review of the whole test, the umpires decided that the marks were equally divided between the two competing classes. This result was not unlooked for by those who have had experience of the aptitude of the native children in acquiring learning.

**THE REVENUE FROM DRINK AND TOBACCO.**—In the year ended March 31, 1878, the Excise and Customs duty from spirits in the United Kingdom was £20,675,928; while the duty on malt produced £7,721,549; on wine, £1,628,295; the Excise duty on sugar used in brewing, £526,208; Excise licences on brewers and maltsters and for the sale of beer, spirits, tobacco, and wine, £1,941,912; and the tobacco duty, £8,006,836. The total revenue from these sources is £40,504,600, to which England contributes £29,726,753; Scotland, £5,569,594; and Ireland, £5,208,253. The estimated population of England on June 30 last was 34,854,397; Scotland, 3,593,929; Ireland, 5,433,640—total 43,881,966.

**JEWISH SCHOOLS.**—Mr. Le Page Renouf, one of her Majesty's Inspectors of Schools, stated, in his report last year on schools in the Tower Hamlets, that the largest school in his district, and probably in all England, is the Jews' Free School in Bell Lane, Spitalfields. The average attendance last year was 1,248 boys and 850 girls. At one of his visits he found 2,437 children present—1,452 boys and 985 girls. There are nine certificated masters and six certificated mistresses, six assistant-teachers and thirty-six pupil-teachers. The inspector bears witness to the influence of the school upon so large a number of children,

many of whom belong to foreign families, in which the English language is but rarely and most imperfectly spoken, and who are also of migratory habits. The inspector says he finds no school in which so large a proportion of the pupil-teachers, especially of the boys, obtain the grants under Article 19. He is obliged to hold a separate examination for the Jewish pupil-teachers of the district, as they are unable to attend the general examination, which is always held upon a Saturday. He takes occasion to remark that there are limits beyond which religious minorities, like Jews or Roman Catholics, cannot without injustice be compelled to work with the majority. He adds that a large Jewish infants' school is held in Commercial Street, Spitalfields, and that in many visits to this school, private as well as official, he has never seen a little child idle.

**FUNERAL AND MOURNING REFORM.**—A Church of England Funeral and Mourning Reform Association has been formed. At the inaugural meeting held at Sheffield during the Congress of last year, the Bishop of Sodor and Man presiding, the following resolution was moved by Earl Nelson and seconded by the Rev. Erskine Clarke, Vicar of Battersea:—"That an association be formed called the Church of England Funeral and Mourning Reform Association, the members of which shall encourage the adoption of such observances only as are consistent with a hope of resurrection to eternal life through Jesus Christ our Lord; and discourage feasting and treating on the day of burial, and all useless extravagant expenditure in the coffin and its furniture, on the occasion of the funeral, and in the wearing of mourning; the members adopting the broad ground that funerals should be conducted and mourning worn without the unmeaning pomp, vain ostentation, and dismal pageantry of hatbands, scarves, plumes, mourning coaches, heavy crape trimmings, and the like, which involve unprofitable expenditure, inflict severe hardship upon persons of limited means, and neither mitigate grief nor manifest respect for the dead." It was stated that already many influential clergymen and laymen had joined the association—the Archbishop of York, Earl Fitzwilliam, K.C. (Lord-Lieutenant), Lord Wenlock (Lord-Lieutenant), the Lord Mayor of York, the Earl of Zetland, the Earl of Wharfedale, Earl Cathcart, the Bishop of Ripon, Lord Pollington, Lord Teignmouth, Lord Middleton, Lord Muncester, Lord Hawke, the Deans of Ripon and Manchester, Archdeacons Cust, Hey, Watkins, and Blunt, Mr. Beresford Hope, Canon Ryle, the Vicars of Sheffield, Leeds, Hull, Wakefield, nearly all the clergy of the diocese of York, members of Parliament, justices of the peace, naval and military officers, doctors, lawyers, merchants, tradesmen, and working men. Notwithstanding all this array of authority; it will be long before public opinion is "reformed" on this subject. The undertakers are a very powerful "interest," and they have ready allies in popular usage. By a "decent funeral" is meant, in common language, a burial beyond the means and position of the mourning family. Even in thrifty Scotland there is a vulgar prejudice in favour of a dead person being "we'll put awa'," which means buried with needless display and expense.

**AN AMERICAN CRACK SHOT.**—Mr. Joseph Partello, a clerk in the War Department at Washington, according to the "New York Herald," accomplished a most marvellous feat. From the statement made by our American contemporary, it appears that during a practice trial at the target ranges of the Columbia Rifle Association last October, Mr. Partello achieved the extraordinary score of 224 out of a possible 225. In other words, he made at the three ranges of 800, 900, and 1,000 yards, 44 out of a maximum of 45 bull's-eyes. The actual record was, first, a string of 15 bull's-eyes at the 800 yards range, which he followed up with 12 bull's-eyes at 900 yards. This made 27 consecutive bull's-eyes. The next shot was a "centre," but the marksman at once recovered his extraordinary skill, finishing the 900 yards range with two bull's-eyes, and completing his record by an unbroken string of 15 bull's-eyes at the 1000 yards. The nearest approach to this wonderful performance was at the walk-over of the American team at Creedmoor, a few days before, for the international trophy, when Sumner attained the then unparalleled score of 221, beating by two points Bruce's score of 219 at the international contest at Creedmoor in 1876. Mr. Partello is, comparatively speaking, a young hand at the rifle, having begun to practise only two years ago. He is about twenty-five years of age, rather under the medium height, and slightly built; he does not weigh much over 9st. 4lb. His tastes have hitherto been of a literary and musical nature, and he acts as organist in a church at Washington. He has been a teetotaler, and recently, to promote the steadiness of his nerves, he gave up smoking.



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## Contents.

"Wait a Year." Chaps.  
VI-XIII. . . 65, 81, 97, 113

In Pursuit of the Sikhs  
and Afghans. I. II. . 70, 87

English Provincial Dialects 74

How Mr. Joseph Potter  
lost his Silver Spoons.  
Chaps. I-IV. . . . 76, 93

Legal Anecdotes. II. III. 85, 103

The Origin of Life . . . 90

Automata. II. By JOHN  
NEVIL MASKELYN . . . 103



## Contents.

Natural History Notes . 104

Utopian Experiments and  
Social Pioneerings. II.  
By the Rev. M. KAUFMANN,  
M.A. . . . . 106

"When George the Third  
was King" Chap. II. . 118

St Paul's Bells . . . 122

Flowers and their Folk-  
lore. . . . . 125

The Fisherman's Orphans 72

The Edelweiss . . . 110

Varieties. . 79, 95, 112, 128

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